

REVISITING THE STRENGTH OF TRADITIONAL - SUSTAINABLE DEVELOPMENT AND VERNACULAR ARCHITECTURE IN INDIA

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ABSTRACT

In recent times, alongside the shift towards more technologically integrated urban homes and architecture, there is also seen a shift towards unsustainable and environmentally unfriendly methods of architecture. Over the centuries of the evolution of humanity, different civilizations have developed different types and forms of architecture that are suited to their local and contextual requirements. Such vernacular architecture is oft suited to the bioclimatic zone of the region, creating a space that can be lived in, in a sustainable manner. Numerous factors such as sociocultural environment, materials, economy and technological availability are responsible (alongside climate) as the main influencers of the architecture of the built environment in locations. This paper attempts to consider, in the Indian context, the value of vernacular forms of architecture in demonstrating a sustainable model which must be revisited in the age of climate change and environmental degradation, to look at alternative (and traditional) materials, methods, and styles of constructing built environments both in urban as well as rural areas in different parts of India.

Keywords: Sustainable Development, Vernacular Architecture, Environment, Tradition

INTRODUCTION

Over the centuries of the evolution of humanity, different civilizations have developed different types and forms of architecture that are suited to their local and contextual requirements. Such vernacular architecture is oft suited to the bioclimatic zone of the region, creating a space that can be lived in, in a sustainable manner. Numerous factors such as sociocultural environment, materials, economy and technological availability are responsible (alongside climate) as the main influencers of the architecture of the built environment in locations. India, specifically has a vast diversity of bioclimatic zones, different ethnicities and different micro-economies in its many regions. While the shift towards more technologically integrated urban homes and architecture has led to evolving standards of infrastructural planning and design, with the usage of new

materials creating new opportunities for novel designs and methods of creating built environments, there is also seen a shift towards unsustainable and environmentally unfriendly methods of architecture. This has further seen change over the years, where globalization has resulted in architectural influences being shared across the world, and a turn towards more modernistic designs has occurred. This paper attempts to consider, in the Indian context, the value of vernacular forms of architecture in demonstrating a sustainable model which must be revisited in the age of climate change and environmental degradation, to look at alternative (and traditional) materials, methods, and styles of constructing built environments both in urban as well as rural areas in different parts of India. Examples of vernacular architecture will be revisited to analyze the same, drawing a strong theme of bio-climatism and passive environment control systems that exist with such an architecture, that create comfortable living environments while still being sustainable in its creation (Vural, Engen, et.al., 2007).

Specifically, it is seen that building that are made using locally available materials are also more environment friendly and climate-sensitive. With India's climate diversity, there is a heightened need for both sustainability as well as climate control within homes and other buildings. As opposed to preventing us from revisiting these traditional forms of architecture, the current presence of modern technology and techniques could further empower us to do so, to finally arrive at an organic understanding of the relationship between the human, the lived environment, and the quality of life. This paper thus hopes to create an alternative sociological and architecture understanding of our relationship with space and the natural environment, to create artificial environments that are in synchronicity to the natural environment as opposed to being harmful and in different opposition to it.

BACKGROUND

Bio-climatism is a concept that integrates the micro-climate and architecture with human thermal comfort conditions (Helena, 1998). Various studies on vernacular architecture demonstrate that bio-climatism plays a crucial role in determining the sustainability and endurance of modern architecture (Sayigh & Marafia, 1998; Mohammed, 2004). Bio-climatism, in this case, includes solar passive features and micro-climatic conditions, where building design also takes into consideration the need to improve the artificial energy efficiency of the building and thermal comfort conditions. A primary determining feature of vernacular architecture, thus, is the usage of locally available materials to address contextual region-specific conditions and problems. Not only is this an architectural and aesthetic matter, but rather a more complex process with historical, cultural, economic, and environmental influences factoring in. Over years, specifically in India, different groups have formed with intricate knowledge about these different local architecture forms, with this knowledge being passed down through traditions and information

over generations. Hence, this knowledge is refined over years of trial, error and revision, and further handed down to future generations (Gallo, 1994). Geography, culture, and society are high influences in this process -- with both region and religion mattering equally in the creation of vernacular architecture.

However, studies have found there to be heightened similarities in regions that are geographically quite apart, yet are climatically similar (Gallo, 1994). Such architecture has the potential to reveal insights into thermal passive approaches that not only provide flexibility to the structure and maximum adaptability but are also not energy intensive. Modern architecture using materials like steel, cement and bricks, on the other hand, are highly energy intensive. Existing scholarship in the field shows that embodies energy cost as well as running costs can be highly diminished and reduced by utilizing climate-responsive vernacular building designs (Gallo, 1998). Such kind of architecture also has the potential towards greater sustainability by reducing the emission of greenhouse gases and carbon by 60% or even more, which roughly is equivalent to about 1.35 billion tonnes of carbon (Tzikopoulos, et.al., 2005). Thus, now the importance of considering bio-climate sensitive architecture is not merely an option born out of aestheticism or luxury, but rather since it is a necessity for energy conservation, environmental conservation, reduced carbon footprint, and long-term sustainability (Singh, Mahapatra & Atreya, 2009). In this manner of sustainability, environmentalism and traditionalism aren't in opposition to one another, nor even supplementary or complementary, but rather pre-requisites to each other (Mohammed, 2004; Tiwari, 2001). Traditional and vernacular architecture forms thus require a critical and scientific understanding to best observe and utilize any lessons they may provide to a civilization that is currently on the precipice of a heightened danger towards global environmental degradation.

Examples of bio-climate based and thermal efficient designs can be seen across the world. Solar energy was utilized efficiently by the ancient Greeks (around 2500 years ago), with respect to the orientation of buildings (Tzikopoulos, et.al., 2005). Later, bath houses in Roman are also observed to have windows facing south that maximize the heat received and retained from solar energy (Singh, Mahapatra & Atreya, 2009). Further, multiple ancient Indian examples exist, with Fatehpur Sikri in Agra and the Red Fort in Delhi being specifically important examples of solar passive vernacular architectural styles (Tiwari, 2001). While different communities, religions and civilizations have created different architectural forms, they are all adapted to local conditions, developed over the ages without access to technology or the ability to artificially produce energy. Thus, these building needed to utilize all the ambient and available energy that naturally occurs in order to maintain a comfortable living space.

DISCUSSION

India has a vast and regionally diverse collection of locally available materials, techniques and approaches to construct buildings that are based on the micro-climate and biotic composition of flora and fauna in regions. These types of architecture are in some instances even based on the ethnicity of the community occupying the lived environment (Tiwari, 2001). Thus, the vernacular architecture of the subcontinent includes both formal and informal structures built with local materials to meet the local needs of people in rural areas, specifically. The vernacular architecture of the country can be categorized into three large subcategories -- *semipukka*, *pukka*, and *kachcha* (Helena, 1998). While *kachcha* buildings are made up of unprocessed natural material such as mud, cane, bamboo, thatch and wood available in the vicinity, these buildings have minimal cost of construction, yet also minimal durability and a specific form. *Pukka* buildings are made up of stone, bricks, tiles, metal or other processed materials and *surkhi* or mortar used for binding. These structures are expensive and do not require regular maintenance. *Semi-pukka* buildings are a combination of *kachcha* and *pukka* style. Common building materials in hilly areas are rocky rubble, ashlar, stone pieces, bamboo, wood and cane. Considering this, it is important to note the different types of bioclimatic zones present in India. There is a large diversity of climates in India, from extremely hot conditions in the desertified regions of Rajasthan, to extreme cold in the mountains and high altitudes such as Kashmir. There is further an existence of regions with high rainfall, specifically in the Northeastern states. This northeast region is classified into three major bioclimatic zones: warm and humid, cool and humid, and cold and cloudy (Singh, Mahapatra & Atreya, 2009).

In **warm and humid climatic zones**, materials used are locally sourced ones such as bamboo, lime, cane, mud and brick, which are used effectively. The main material is *surkhi* (a mixture of lime, brick powder, jaggery and sand) which is used in *pukka* buildings as an alternative to cement. The first floor in most cases is entirely made out of wood, and the ground floor is of brick to act as a buffer between the home and the damp ground (Singh, Mahapatra & Atreya, 2009). Further, these houses have solar passive features, where the buildings are designed in a manner that solar energy is adequately absorbed and retained such that it is warm in winter, and also being able to block out excessive radiation in summer. This requires an intricate understanding of the interrelation between architectural styles, culture, climate, and human lifestyle (Mohammed, 2004). In these bio-climatic regions, the external walls are half made of brick and the other half is of wood, and in the case of mud houses they are built on a raised platform such that the drained water from the roof cannot does not affect the side walls. To further offset the heavy rainfall, most such roofs are also slanted, facing either two or four directions, being further extended to act as an overhang to protect the wall from rainfall (Singh,

Mahapatra & Atreya, 2009). Wind is smartly also used, with windows being carefully placed for best cross-ventilation.

In **cool and humid climatic zones**, the houses are once again made from locally available materials. In this case, however, it is bamboo that is used between two layers of mud for walls. Furthermore, there is observed a clear differentiation between urban and rural houses. While bricks are more popular in urban houses, it's almost entirely not present in rural housing. Elements of social class, status and economy are observed here. In rural areas, the orientation of the house plays a major role, with most of them in North-East India being east-west oriented and south facing in order to receive the maximum solar radiation, for best solar passive features. Further, in **cold and cloudy climatic zones** in India, specifically in hilly regions, stone is largely used for construction in a cheap and economical manner. An area is designed for cooking such that space heating is also possible, and locally available materials like bamboo, cane, and wood are used to construct the roof. This is a low energy dwelling, with an elevated floor made of wooden planks (Singh, Mahapatra & Atreya, 2009). Wood helps insulate the environment inside the building from the cold alongside other materials such as cane leaves. The houses are also built in a very compact fashion, with low ceiling height, and minimum surface to volume ratio to leverage the heat gain inside the house (Singh, Mahapatra & Atreya, 2009). Lastly, in rural areas in the bio-climatic zone, the houses are built in a furthermore sustainable manner to meet everyday requirements -- while rural houses are dispersed, urban ones are tightly packed with respect to space. There is seen to be a uniformity in architectural styles of both urban and rural houses 70 years ago in many of these states including Assam, which denotes a lesser socioeconomic differentiation in the past to a large extent (Singh, Mahapatra & Atreya, 2009).

CONCLUSION

This study on vernacular architecture not only seeks to underline the general and basic principles behind solar passive and thermal efficient features but rather further hopes to create an understanding behind the local sourcing of materials, the usage of sustainable design practices, and the largescale reduction in carbon emissions by doing so, both during construction as well as after due to the thermal efficiency. If such vernacular architectural styles were adopted in more regions across India and the world, specifically in urban areas, it could allow for a drastically improved eco-friendly and resilient built environment that not only accommodates the needs of the human participants and society but is also not at odds with the natural environment. These houses are constructed by using locally available materials and also integrate the bi-oclimatism concept with socio-economic status and socio-cultural setup. Thus these kinds of buildings are paradigmatic examples of sustainable design, the following of which could create a better and more environment friendly time of architecture.

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